SOUTH DAKOTA MINES

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BioSNTR
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IMPACT SCIENCE

NANO-BME Seminar

Time: 4:00PM Thursday, Jan 27

Location: https://sdsmt.zoom.us/j/94046899625

Squeezing Photons in Space and Time: Multi-Photon Imaging of Nano-Biomaterials

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Abstract: Our group specializes in spatially resolved spectroscopy and imaging of nanomaterials, with an emphasis on multiphoton processes and nonlinear optics. We developed a spectrally resolved multiphoton microscope system with a Ti:Sapphire femtosecond oscillator and sync-pumped OPO, tunable from 400nm-1050nm (oscillator and frequency doubling) and 1.1-2.4µm (OPO signal and idler), respectively (Figure). The microscope forms rasterized images utilizing a piezoelectric stage, and is spectrally resolved using transmission gratings in a conjugate plane (a representative spectral image, showing second harmonic generation and two photon induced fluorescence correlatively imaged in collagen rich arterial wall is shown in the figure). These spectrally resolved images can be used to form ratiometric images, which we have shown are much less sensitive to turbidity or scattering. I will discuss some of the basic physics and technology of making such measurements and results of representative multiphoton imaging experiments in non-invasive vascular scaffolds (NVS), in development for the treatment of peripheral artery disease, and imaging gene expression in transgenic soy bean roots.

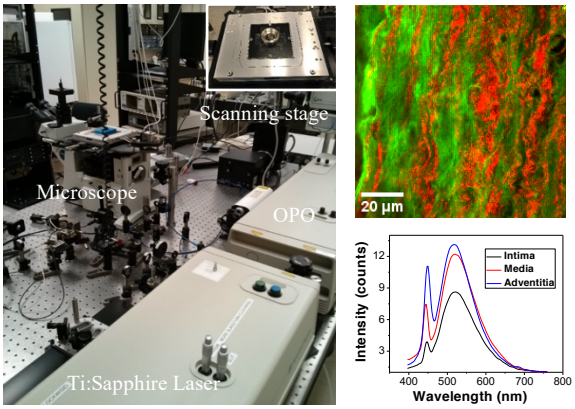

Figure: (left): Multiphoton microscope with femtosecond lasers and scanning stage. (right): Multiphoton fluorescence (green) and SHG (red) image and spectra (SHG at 450nm) of collagen rich arterial wall after photopolymerization of NVS.